A new species of *Holospira* (Gastropoda: Pulmonata: Urocoptidae) from Coahuila, Mexico

Lance H. Gilbertson
Malacology Section
Natural History Museum of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007 USA
Lngilbert@gmail.com

Edna Naranjo-García
Instituto de Biología, Departamento de Zoología
Universidad Nacional Autónoma de México
Avenida Universidad 3000, Ciudad Universitaria
C.P. 04510, Distrito Federal, MEXICO
naranjo@servidor.unam.mx

ABSTRACT

A new trilamellate *Holospira* Martens, 1860 from southeastern Coahuila, Mexico is described and assigned to *Holospira* sensu stricto. The species is found near the summit of Sierra La Viga at 3,600 meters (11,810 feet), a new elevation record for the genus; however, *Propilsbrya koestneri* Rehder, 1940 is found at a similar elevation.

Additional keywords: Landsnail, lamella, whorl, Sierra La Viga

INTRODUCTION

The urocoptid genus *Holospira* Martens, 1860 is comprised of moderately small species of landsnails bearing cylindroconic to turriform, nondecollate, tightly coiled shells. They have a hollow internal column that usually exhibits a lamella (columellar/axial) within the penultimate whorl. Up to three additional internal lamellae may be present (parietal, basal, and palatal), arising from the upper, lower, and outer walls of the shell respectively. When only three lamellae are present, the combination consists of the columellar, parietal, and basal; the palatal is lacking (see Pilsbry, 1946; Thompson and Mihalcik, 2005). Thompson and Mihalcik (2005) noted that in the sequence of ontogenetic development of the shell, the palatal is the last lamella to form. The species described herein exhibits this trilamellate condition.

Holospira is a prolific and widespread genus typically inhabiting isolated limestone outcrops from the southwestern United States (Arizona, New Mexico, and Texas) to southern Mexico (Oaxaca). The new species is found near the summit of Sierra La Viga in the northern Mexican state of Coahuila at 3,600 meters, the highest known elevation site for a *Holospira*. This mountain is near the northern end of the Sierra Madre Oriental, the major mountain range of eastern Mexico. The previously known elevation record for a *Holospira* was 2,896 meters (9,500 feet; Bartsch, 1906) for *H. nelsoni* Pilsbry, 1903, from the more westerly Sierra Guadalupe, Coahuila. However, another urocoptid species, *Propilsbrya koestneri* Rehder, 1940, from nearby Nuevo Leon, is found at 3,650 meters, slightly higher than *H. fergusoni* new species.

MATERIALS AND METHODS

Shells of the new species were hand-collected by George M. Ferguson on 22 May 1986.

For the scanning electron micrograph of the embryonic whorls, the uncoated holotype shell was mounted on a copper stub with carbon-conductive tabs (PELCO tabs). The micrograph was taken with a Hitachi S-3000N scanning electron microscope.

Abbreviations of institutions used in this article are as follows: CNMO, Colección Nacional de Moluscos (Mexico); LACM, Natural History Museum of Los Angeles County; SBMNH, Santa Barbara Museum of Natural History; UF, Florida Museum of Natural History, University of Florida.

SYSTEMATICS

Superfamily Urocoptoidea Uit de Weerd, 2008
Family Urocoptidae Pilsbry and Vanatta, 1898
Subfamily Holospirinae Pilsbry, 1946
Genus *Holospira* Martens, 1860
Subgenus *Holospira* sensu stricto

Holospira fergusoni new species
(Figure 1, Table 1)

Diagnosis: Shell medium brown, with a moderately attenuate cone gradually enlarging into a stout, cylindric basal region. Armature of three lamellae with greatest development in antepenultimate or first part of penultimate whorl. Peristome slightly expanded on basal and columellar margins, otherwise simple.

Description (Figure 1; Table 1): Shell dextral, cylindroconic, average in size for a *Holospira*, uniformly brown in color, whorls 14.5–15.1 in number. Cone

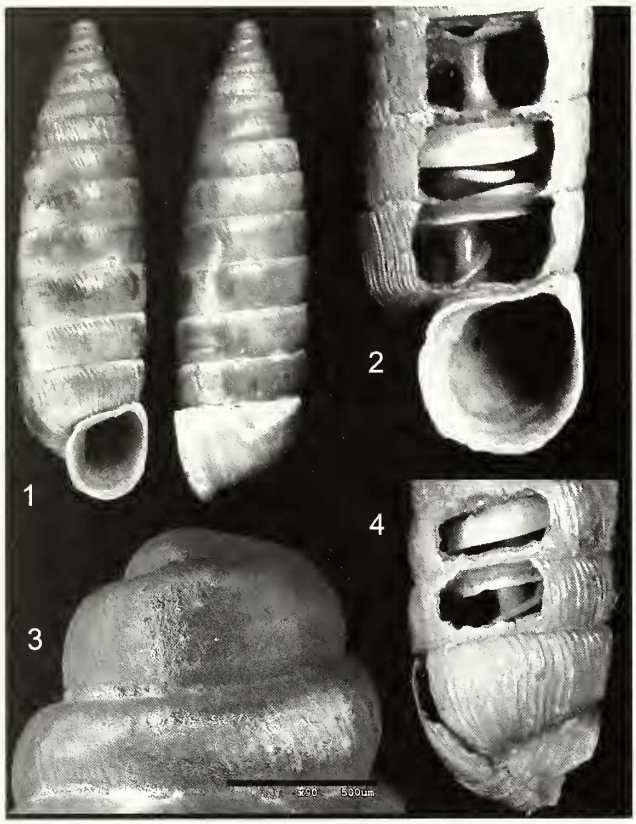

Figure 1. *Holospira fergusoni* new species. **1.** Holotype (LACM 3112), apertural and side views, shell 14.7 × 4.1 mm. **2.** Paratype (CNMO 2562a), shell broken to expose an apertural view of columella and lamellae, maximum shell width 3.9 mm. **3.** Holotype, SEM of embryonic whorls, scale bar = 500 µm. **4.** Paratype (CNMO 2562b), shell broken to expose side view of columella and lamellae, maximum shell width 3.8 mm.

Table 1. Shell measurements (mm.), whorls and number of lamellae of *Holospira fergusoni* new species. Mean measurements include holotype. Paratype at SBMNH broken, not measured. Ap. = aperture; * indicates that apex of shell is broken off, measurement not used for mean.

Shell	Length	Width	# Whorls	Ap. height	Ap. width	Lamellae
Holotype	14.7	4.1	15.1	2.5	2.3	3
Paratypes						
CNMO 2562a	14.0	3.9	14.3	2.4	2.5	3
CNMO 2562b	13.0*	3.8	11.0*	2.0	1.9	3
UF 425856	13.0	3.8	14.5	2.0	2.1	3
$\bar{x}$	13.9	3.9	14.6	2.2	2.2	3

moderately attenuate, gradually enlarging into a stout, cylindric, basal region. Embryonic whorls smooth, 2.6 (holotype) with first 1.6 moderately inflated and steep-sided. Subsequent whorls of cone about 6.5, gradually enlarging, convex; costate, with numerous, well-defined, retractively slanted axial riblets having interspaces about equal in width to riblets. Whorls of cylindric portion of spire about 4.5–5.0, fairly equal in size but widest at antepenultimate whorl, imperceptibly tapering into whorls of cone apically and penultimate and body whorls basally, flattened but with marked suture, very slightly wider at upper margin giving a hint of (upward) overlapping at suture; riblets less pronounced than on cone (usually becoming semi-obsolete between whorls of cone and penultimate whorl), vertical to slightly retracted, thin, numerous (ca. 77 on antepenultimate, 75 on penultimate whorls of holotype), occasionally discontinuous. Body whorl barely extended and slightly descending at peristome, ribbed (or smoothish but becoming ribbed near aperture). Aperture auriculate (extended at upper-outer angle), about as wide as high; peristome slightly expanded along basal and columellar margins, otherwise simple. Umbilicus narrowly perforate.

Internal column, hollow, narrow in apical two-thirds of shell; slowly increasing in diameter as animal grows to adulthood (about 0.15–0.18 times width of shell at penultimate whorl); trilamellate. Greatest development of armature occurs in antepenultimate or first third of penultimate whorl. Columellar lamella large, thick, arising slightly below mid-whorl and extending laterally at least 0.5 times width of lumen in first part of penultimate whorl, becoming sinuous at maximum development, tapering and spiraling basally through first half of body whorl. Parietal lamella a smooth (nonserrated), pendant, wide band, very slightly reflected toward outer wall of shell in last half of antepenultimate and first half of penultimate whorls, sometimes occluding view of columellar lamella (Figure 1, lower right image), becoming reduced in last half of penultimate whorl, then decreased to a low crest in first half of body whorl. Basal lamella a short, low, rounded arch. Palatal lamella lacking.

Type Material: Holotype: LACM 3112; Paratypes: CNMO 2562 a, b (two shells); SBMNH 84922 (one shell); UF 425856 (one shell).

Other Voucher Specimens: CNMO 3168, *Helicina* sp. (one shell); CNMO 3169 *Omphalina* sp. (6 shells).

Type Locality: MEXICO, Coahuila, Municipio Arteaga; Sierra La Viga, 0.5 km E of summit, 25°21′35″ N, 100° 33′15″ W; elevation 3,600 m. The site is approximately 55 km ESE of Saltillo, near the border with the state of Nuevo Leon. Shells of the new species were found under boulders on the North-facing slope of a limestone ridge. In addition, a shell of *Helicina* sp. and several shells of *Omphalina* sp. were found at the site. The area is forested with the dominant plant species being *Pinus hartwegii*. The site is rather difficult to get to.

Etymology: The new species is named after George M. Ferguson of the University of Arizona, Tucson, who collected the shells. A herpetologist by training, his interests also include plants and mollusks. He has always

shared his landsnail collections from remote places with us.

Remarks: The unique internal lamellae of *Holospira* species are typically used as characters for taxonomic purposes. Several subgeneric and section taxa have been based solely on the number and combinations of these lamellae, leading to a confusing array of names and eventual synonymics. Classically, the nominate subgenus (or "section") has been defined by the presence of all four lamellae in the penultimate whorl (Dall, 1895; Pilsbry, 1903, 1946). Additional section names were erected (primarily in the U.S.) for species having 0, 1, or 2 lamellae (Dall, 1895). Bartsch (1906) proposed the subgenus *Tristemma* for trilamellate species (Type species: *Holospira ferrissi* Pilsbry, 1905; Arizona) and later (1945) replaced it (preoccupied name) with *Malinchea*. Pilsbry (1946), noting that no external shell character is correlated with the number of lamellae, and that several U.S. species such as *H. ferrissi* exhibit widely variable numbers (1–3), synonymized *Tristemma*, *Malinchea*, and others with the subgenus *Bostriehoeentrum* Strebel, 1880. A few years later, he (Pilsbry, 1953) stated that "the supposed subgenera based on the number of internal lamellae merely represent parallel stages in evolution." Under the heading of "*Holospira s.str.*," he suggested that four trilamellate Mexican species of *Tristemma* and *Malinehea* described by Bartsch should be "...viewed as species of *Holospira* which have lost that (palatal) lamina, and not relatives of *H. ferrissi* of Arizona..." He proceeded to describe a trilamellate species, *H. maxwelli*, and place it in *Holospira s.s.* (however, leaving *Bostriehoeentrum* unchanged). At the same time, he introduced subgenus *Prionoloplax* for a trilamellate species that exhibits a serrated parietal lamella. Bequaert (Bequaert and Miller, 1973) working in Arizona, synonymized *Tristemma* and *Malinehea* (and others) with a bilamellate subgenus, *Eudistemma* (Dall, 1895). Later, Schileyko (1999) synonymized *Tristemma*, *Malinehea*, *Bostriehoeentrum* and *Eudistemma* (and others) with *Holospira* sensu stricto. Thompson and Mihalcik (2005) assigned several trilamellate species from southern Mexico, to *Holospira* sensu stricto. More recently, Thompson (2008) listed *Eudistemma*, *Tristemma*, and *Malinehea* as synonyms of the nominate subgenus. Based on the foregoing, the trilamellate *H. fergusoni* new species is presently assigned to *Holospira* sensu stricto.

The new species resembles the tetralamellate *Holospira* (*H.*) *amalthea* Bartsch, 1926 from nearby Monterrey, Nuevo Leon. *Holospira amalthea* exhibits a similarly shaped, brown shell that has the greatest development of its lamellae in the antepenultimate whorl. These lamellae are generally comparable to those of *H. fergusoni* new species, except that the parietal is decidedly out-curved at its free margin, the basal is more strongly developed, and the palatal is present (and strong). *Holospira amalthea* also differs by having a broadly expanded and reflected outer lip of the peristome.

Holospira fergusoni new species also shows some similarities to *Holospira* (*H.*) *nelsoni* and *H.* (*H.*) *infanta* Bartsch, 1906 from the Sierra Guadalupe, a range approximately 50 km W of Saltillo. However, *H. nelsoni* is larger, white in color (with blue flecks), and has a more rounded spire than that of the new species. *Holospira infanta* is similar to *H. nelsoni* but much smaller. The shells of both species have all four lamellae contained primarily in the penultimate whorl.

It is noteworthy that the reproductive system of *H. nelsoni* is the only published account of this system from a species assigned to *Holospira* sensu stricto living in this region (Pilsbry, 1903). Although different in certain respects, it shows similarities to that of *H. ferrissi* (type of *Tristemma*) and similar nearby U.S. species (i.e. *Eudistemma* sensu Bequaert and Miller) with regard to the presence of longitudinal internal penial folds (showing through), a long epiphallus, a similar appearing spermatheca, and the presence of a spermathecal diverticulum (see Gilbertson, 1993; Schileyko, 1999). Hopefully, additional descriptions of reproductive systems from species inhabiting this region will be available in the near future.

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